PERMIAN FOSSIL MARINE INVERTEBRATES FROM THE NORTHERN TERRITORY DESCRIBED BY ROBERT ETHERIDGE JUNIOR

N. W. ARCHBOLD[A], R. H. SWART[A] & J. M. DICKINS[B]

[A]School of Aquatic Science and Natural Resources Management, Deakin University, Rusden Campus, 662 Blackburn Road, Clayton, Victoria 3168
[B]Australian Geological Survey Organisation, GPO Box 378, Canberra, ACT 2601

ARCHBOLD, N. W., SWART, R. H. & DICKINS, J. M., 1996:12:31. Permian fossil marine invertebrates from the Northern Territory described by Robert Etheridge Junior. *Proceedings of the Royal Society of Victoria* 108(2): 63–71. ISSN 0035-9211.

Three specimens of Permian marine fossil invertebrates, previously thought to be possibly lost but now known to be housed in the collections of the Museum of Victoria, are photographically illustrated for the first time and taxonomically reassessed. Lectotypes are formally selected for *Oriocrassatella stokesi* Etheridge fil. and *Bellerophon pennatus* Etheridge fil. The palaeobiogeography of *Oriocrassatella* is briefly reviewed.

ROBERT ETHERIDGE Junior described numerous Permian marine invertebrate fossils from the region of Treachery Bay, Port Keats area, Northern Territory, in a series of four reports published from 1895 to 1907. Many of the specimens that were originally collected by the Government Geologist of South Australia, Henry Yorke Lyell Brown, and his staff are housed in the South Australian Museum and several of these have been refigured (Dickins 1963; Archbold 1981, 1986; Archbold & Thomas 1993). However a few important specimens were not located in the South Australian Museum (Dickins 1963: 103, 186); currently they are housed in the Museum of Victoria.

The Museum of Victoria obtained the specimens when it purchased in 1972 the fossil collections of the Kyancutta Museum (South Australia). It appears likely that the Kyancutta Museum obtained the material from the Port Adelaide Institute Museum which received material donated by H. Y. L. Brown (Dr T. A. Darragh, Museum of Victoria personal communication to N.W.A.). The present work photographically illustrates the specimens from the Museum of Victoria for the first time and designates lectotypes for the species *Oriocrassatella stokesi* Etheridge fil. and *Bellerophon pennatus* Etheridge fil. The missing ventral valve internal mould of *Megasteges septentrionalis* (Etheridge fil.), reported by Archbold (1986), is re-illustrated and discussed briefly.

STRATIGRAPHY, LOCALITIES AND AGE

The onshore Permian stratigraphy of the Port Keats District, Bonaparte Basin, Northern Territory has been documented by Thomas (1957, 1958) and Dickins et al. (1972) and summarised by Skwarko (1993a). Faunal horizons within the onshore sequence were progressively elucidated by Thomas (1957), Dickins et al. (1972) and Archbold (1988). A relatively informal series of stratigraphical names was developed for the onshore Permian sequence as compared with a formal named sequence of units for offshore sequences (see tables 4 and 5 in Skwarko 1993a). Table 1 summarises the onshore terminology of various authors and the current understanding of faunal horizons in the Port Keats District compared with both the Australian Geological Survey Timescale (see Archbold & Dickins 1996) and the brachiopod zonation scheme for the Permian of Western Australia (Archbold 1993, 1995).

Material illustrated and discussed herein comes from two faunal horizons within the Port Keats sequence. *Oriocrassatella stokesi* and *Bellerophon pennatus* were collected from the marine beds which crop out at Fossil Head. These beds share numerous brachiopod species with the fauna of the Coolkilya Sandstone of the Carnarvon Basin and the Lightjack Formation of the Canning Basin (Archbold 1993). The Faunas of these units are considered to belong to the Middle to Late Kungurian *Neochonetes (Sommeriella) afanasyevae* Zone, a view consistent with earlier studies of the bivalves (Dickins 1956). The specimen of *Megasteges septentrionalis*, which could not be located for the revision of the species (Archbold 1986), came from Cape Dombey, from beds high in the 'Upper Marine Beds' of Thomas (1957) considered to be Dzhulfian in age (previously referred to the Chhidruan, see Archbold 1988) and belonging to the *Waagenoconcha (Wimonoconcha) imperfecta* Zone.

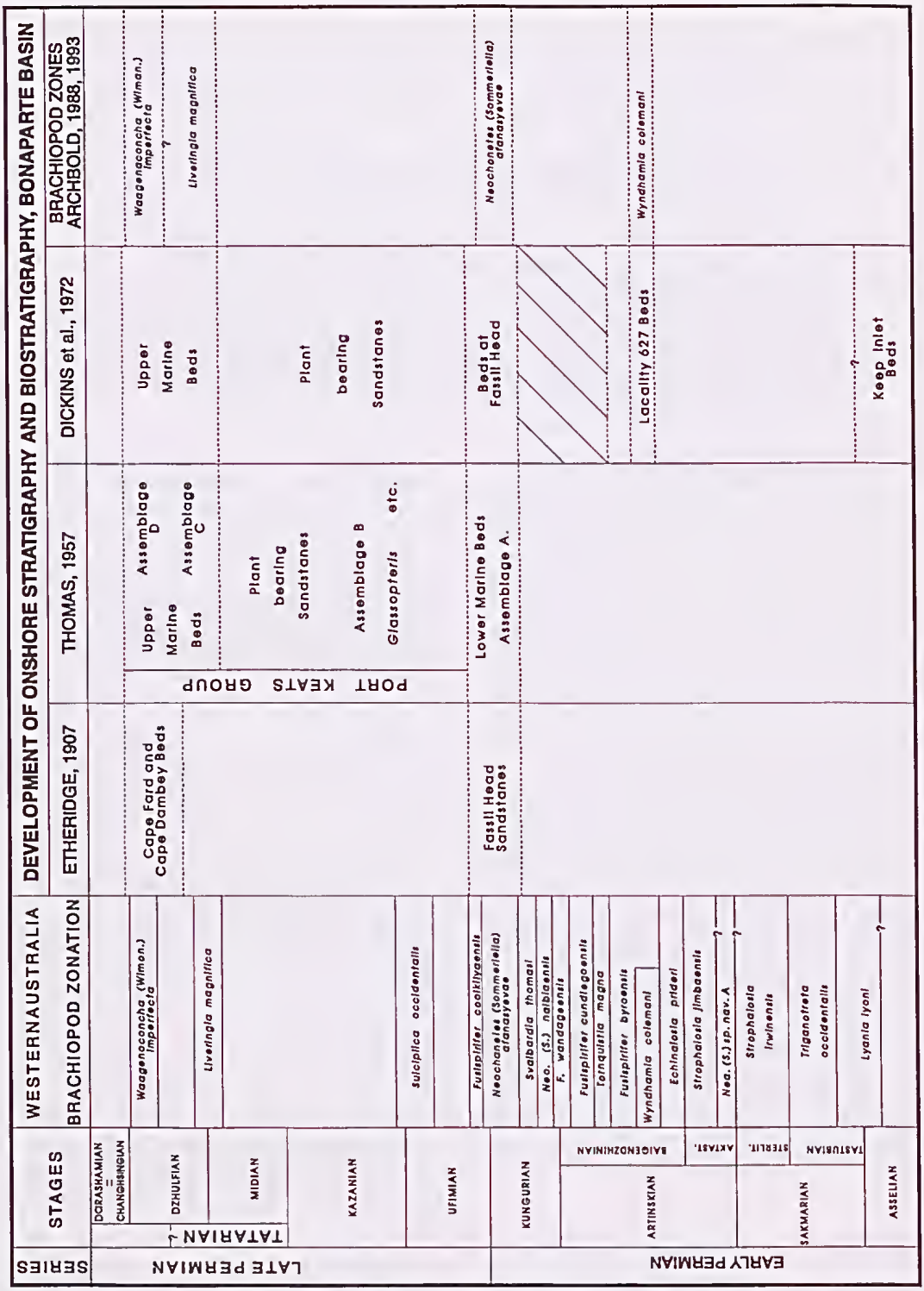


Table 1. Development of stratigraphy of onshore Permian sequence of the Port Keats District, Northern Territory and brachiopod zones currently recognised within the sequence.

PALAEOBIOGEOGRAPHY OF *ORIOCRASSATELLA*

The occurrence of crassatellid bivalves in Late Palaeozoic strata was first documented in detail in a beautifully illustrated account by Yakovlev (1902) that has often been overlooked by subsequent workers. Yakovlev studied a range of specimens, from numerous localities within the Kazanian of the Russian platform, referred to the species described by Golovkinskiy (1868: 368, pl. 3, figs 21–23) as *Schizodus planus*. Golovkinskiy's lithographic illustrations do not accurately show the dentition of the species but Yakovlev's photographic illustrations (1902, pl. 10, figs 1–7) provide clear details of the exterior of the species and the dentition of both valves. Yakovlev (1928) subsequently designated Golovkinskiy's species as the type species of *Procrassatella*. In 1902 he referred *Schizodus planus* to the Cretaceous genus *Crassatellina* Meek. Etheridge (1907) independently recognised the occurrence of crassatellid bivalves in the Late Palaeozoic sequence at Fossil Head, Northern Territory, and named the new genus *Oriocrassatella*, with type species *O. Stokesi*.

Since the pioneer studies reviewed above, numerous reports of *Procrassatella* and *Oriocrassatella* have been made around the globe. *Procrassatella* was considered to be a junior subjective synonym of *Oriocrassatella* by Newell (1958), a view anticipated by Teichert (1951: 82), and this has been accepted by subsequent authors.

The geologically oldest record of *Oriocrassatella* is that of *O. compressa* Maxwell (1964) from the Namurian of the Barrington District, New South Wales (Campbell & McKelvey 1972). *O. compressa* was originally described from localities attributed to the Late Carboniferous and Early Permian Rands and Burnett Formations of the Yarrol Region, Queensland (Maxwell, 1964). However after reassessment of the localities by one of us (J.M.D.) they are considered to be of comparable age to the New South Wales occurrences.

Numerous records of *Oriocrassatella* from throughout Gondwanaland and peripheral regions are known from the Sakmarian and Early Artinskian. South American records include those from Argentina (Gonzalez 1976, 1982; Mancenido et al. 1976). Australian records are from the Bowen Basin of Queensland (Dickins 1961) and the Perth, Carnarvon and Canning Basins of Western Australia (Dickins 1963; Dickins & Skwarko 1993). Late Sakmarian–Aktastinian records of the genus are also known from the Badhaura Formation, Rajasthan, Peninsula India (Dickins & Shah 1979). Kashmir (Reed 1932), Northwest Xizang (Liu & Cui 1983), Afghanistan (Termier et al. 1974) and Oman (Dickins & Shah 1979).

Baigendzhinian records of the genus are those from the Coyrie Formation and Mallens Sandstone of the Carnarvon Basin, Western Australia (Dickins 1963; Dickins & Skwarko 1993) and the Aimau Formation, Irian Jaya (Dickins & Skwarko 1981). A Brazilian record appears to be of Baigendzhinian age (Rocha Campos 1970; Dickins 1993: 528).

Kungurian records of *Oriocrassatella* are those of the type species, *O. stokesi*, from the Nalbia and Coolkilya Sandstones of the Carnarvon Basin, the Lightjack Formation of the Canning Basin and the beds at Fossil Head, Bonaparte Basin, and an apparantly closely related species from the Munurudshakskiy Horizon of Prikolymia and the upper Magiveemskoi Suite of the Omolon Massif, Northeastern Siberia. The latter species was described and figured as *Astartella omolonica* by Muromtseva (1984: 87, pl. 38, figs 12–16).

The Late Ufimian and Kazanian were apparently times of radiation of the genus into the Northern Hemisphere with species in Greenland (Newell 1955), Spitzbergen (Boyd & Newell 1977), Arctic Russia including the Taimyr Peninsula, the Verkhoyansk Mountains, Kanin Peninsula, the Pechora Basin and the Pay-Khoya (Muromtseva 1984; Kanev 1994), the Russian platform (Golovkinskiy 1868; Yakovlev 1902) and western Primor'ya (Lobanova 1961). North American occurrences are restricted to two localities in Wyoming and one in Utah (Boyd & Newell 1968, 1977). Southern Hemisphere Late Ufimian–Kazanian occurrences appear to be restricted to the faunizone 10 of Tasmania (Clarke & Farmer 1976: 107; Clarke 1987: 262).

Reports of *Oriocrassatella* younger than the Kazanian are less well documented but include reports from the Dzhulfian of Basleo and correlative localities in Timor (Hamlet 1928; Wanner 1940) and the Cherrabun Member of the Hardman Formation, Canning Basin, Western Australia (Dickins et al. 1989; Skwarko 1993b). From personal observation (J.M.D.) an undescribed species occurs in the Wairaki Breccia, Southland, New Zealand, of possible Djhulfian age. A report of small *Oriocrassatella* (as *Procrassatella*) specimens from the Kaliningrad region Russia (eastern Zechstein Basin) by Suveizdas (1975: 145, pl. 30, figs 22, 23) is of considerable interest in view of the apparent absence of the genus in the western part of the Zechstein sea (Logan 1967).

The current knowledge of the distribution in space and time of *Oriocrassatella* may indicate

a complex history of migration through time, shifting from a Southern Hemisphere origin in the Carboniferous to a broad global distribution in the Late Permian. Nevertheless the genus appears to have avoided, during its evolution and migrations, the coldest waters of the Gondwanaland region. *Oriocrassatella* appears to have been restricted in its habitat to sub-littoral clastic deposits.

SYSTEMATIC PALAEONTOLOGY

Phylum MOLLUSCA

Class BIVALVIA

Superfamily CRASSATELLACEA Ferussac, 1822

Family CRASSATELLIDAE Ferussac, 1822

Subfamily ORIOCRASSATELLINAE Boyd and Newell, 1968

Genus **Oriocrassatella** Etheridge, 1907

Type species. *Oriocrassatella Stokesi* Etheridge, 1907, from the Kungurian beds at Fossil Head, Port Keats District, Bonaparte Basin, Northern Territory.

Subjective junior synonym. *Procrassatelta* Yakovlev, 1928; type species *Schizodus planus* Golovkinskiy, 1868, from the Kazanian of the Russian Platform.

Comments. *Oriocrassatella stokesi* has been described by a number of authors (Etheridge 1907; Prendergast 1935; Dickins 1956, 1963; Newell 1958; Dickins & Skwarko 1993) and is known from the Nalbia and Coolkilya Sandstones of the Carnarvon Basin, the Lightjack Formation of the Canning Basin and the beds at Fossil Head, Bonaparte Basin. Maxwell (1964: 12) indicated, in error, that the type specimens came from the Nalbia and Coolkilya Sandstones of the Carnarvon Basin. All occurrences of the species are considered to be Kungurian in age (Archbold & Dickins 1996).

Oriocrassatella stokesi Etheridge, 1907

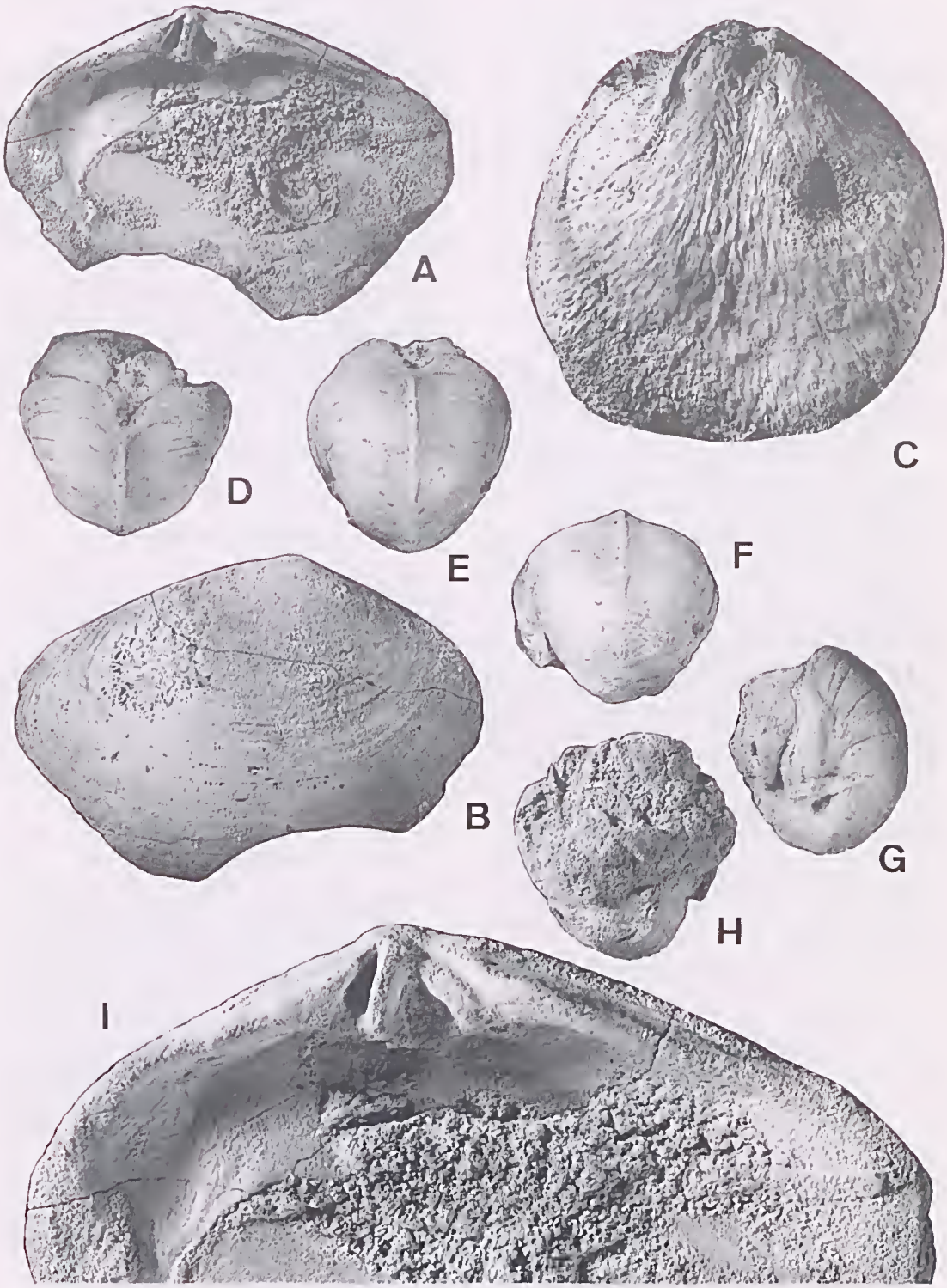
Fig. 1A, B, I

Edmondia, or *Chaenomya*—Etheridge 1895: 33.
Edmondia—Etheridge 1897: 15, pl. 1, fig. 10.
Oriocrassatella Stokesii—Etheridge 1906: 41 (*nomen nudum*).
Oriocrassatella Stokesi—Etheridge 1907: 9, pl. 6, figs 2–5.
cf. *Protoschizodus*—Chapman 1924a: 36.
Oriocrassatelta stokesi—Eth. fil., Chapman 1924b: 7.
Protoschizodus c.f.—Chapman 1924c: 19.
Oriocrassatella stokesi—Etheridge Jnr, Prendergast 1935: 25, pl. 2, figs 19, 20.
Oriocrassatella—Teichert 1941: 383.
Oriocrassatella stokesi—Teichert 1952: 117, 129, 130.
Oriocrassatetta stokesi—Etheridge Jnr, Thomas & Dickins 1954: 221.
Oriocrassatelta—Condon 1954: 85, 86, 87, 92, 94, 95.
Oriocrassatella stokesi—Etheridge Jnr, Dickins 1956: 33, pl. 6, figs 8–14.
Oriocrassatetta—Teichert 1957: 68.
Oriocrassatella stokesi Eth., Thomas 1957: 180.
Oriocrassatella stokesi—Etheridge Jnr, Newell 1958: 3, fig. 2.
Oriocrassatella stokesi—Etheridge fil., Dickins *in* Guppy et al. 1958: 53.
Oriocrassatella stokesi Eth., Thomas 1958: 2.
Oriocrassatella stokesi—Etheridge Jnr, Dickins 1963: 186, pl. 18, figs 6–15.
Oriocrassatella stokesi—Etheridge Jnr, Condon 1967: 173, 184.
Oriocrassatella stokesi—Playford et al 1975: 288.
Oriocrassatella stokesi—Etheridge Jnr, Dickins & Skwarko 1993, microfiche supplement, p. 40, pl. 48, figs 15–17.

Lectotype. Herein selected. The right valve figured by Etheridge (1907, pl. 6, figs 2, 3), housed in the collections of the Museum of Victoria (registered number NMV P30707) and refigured herein in Fig. 1A, B and 1. The second specimen figured by Etheridge (1907, pl. 6 figs 4, 5) and Dickins (1963, pl. 18, fig. 7) becomes the paralectotype. Dickins (1963, pl. 18, fig. 8) also figured a plaster replica of the hinge region of what is now the lectotype.

Comments. The lectotype is the best preserved right valve yet known from the type locality. We note that the posterdorsal profile is concave unlike the convex profile of *O. elongata* Boyd & Newell (1968: 41) and the straight or gently concave posterdorsal profile of *O. plana* Golovkinskiy, see Yakovlev (1902, pl. 10, figs 1, 4–7) and Boyd & Newell (1977, figs A, B, E, G–I). We also note that the anterior cardinal tooth of the lectotype is poorly developed and hence differs subtlely from the well developed teeth of Late Permian species.

Fig. 1. A, B, D–I all from beds at Fossil Head, Treachery Bay, Port Keats Area, Bonaparte Basin, Northern Territory. C from beds at Cape Dombey, Port Keats Area, Bonaparte Basin, Northern Territory. A, B, I, *Oriocrassatella stokesi* Etheridge fil., 1907, lectotype, NMV P30707, natural cast of a right valve in interior and exterior views, ×1, and hinge interior ×2.2. D–H, *Bellerophon pennatus* Etheridge fil., lectotype, NMV P30031, natural cast of shell in anterior, adapertural, posterior adapertural, side and apertural views, ×1. C, *Megasteges septentrionalis* Etheridge fil., NMV P30708, ventral valve internal mould, ×1.


A
C
D
E
F
B
G
H
I

Class GASTROPODA

Superfamily BELLEROPHONTACEA McCoy, 1851

Family BELLEROPHONTIDAE McCoy, 1851

Genus **Bellerophon** Denys de Montfort, 1808

Type species. *Bellerophon vasulites* Denys de Montfort, 1808, see Knight (1941: 52–54, pl. 11, fig. 3a–e).

Bellerophon pennatus Etheridge, 1907

Fig. 1D–H

Bellerophon—Etheridge, 1895: 33.
Bellerophon sp.—Etheridge, 1897: 16, pl. 1, figs 14, 15.
Bellerophon costatus var. *pennatus*, var. nov.—Etheridge, 1906: 41 (*nomen nudum*).
Bellerophon costatus—J. de C. Sby, var. *pennatus*, var. nov.—Etheridge, 1907: 10, pl. 7, figs 5–7.
Bellerophon pennatus Eth.,Thomas 1957: 180.
Bellerophon pennatus Eth., Thomas 1958: 2.

Lectotype. It is not clear from Etheridge's description of his variety *pennatus* how many specimens he had before him. He does, however, provide a clue that more than one specimen was included within the variety when he stated that 'this form has already been figured from imperfect material' (Etheridge 1907: 10), in reference to his 1897 report. We therefore designate the single specimen he figured in 1907 (pl. 7, figs 5–7) as the lectotype of the variety and raise the variety to species status as a distinctive species of Australian Permian *Bellerophon*. The specimen is registered as NMV P30031 in the collections of the Museum of Victoria.

Comments. The species is differentiated from other Western Australian species described by Dickins (1963) by its moderately narrow sinus, narrow slit and relatively sharp ridge at the slit band. Fine growth lines are distinct and are progressively well marked towards the aperture.

Phylum BRACHIOPODA

Class ARTICULATA

Superfamily AULOSTEGACEA Muir-Wood & Cooper, 1960

Family AULOSTEGIDAE Muir-Wood & Cooper, 1960

Genus **Megasteges** Waterhouse, 1975

Type species. *Megasteges nepalensis* Waterhouse, 1975.

Megasteges septentrionalis (Etheridge, 1907)

Fig. 1C

Aulosteges baracoodensis—Etheridge, 1906: 41.
Aulosteges baracoodensis var. *septentrionalis*—Etheridge, 1907: 6, pl. 1, figs 1–5.
Megasteges septentrionalis—(Etheridge)—Archbold, 1986: 49, fig. 1A–F (with synonymy).
Megasteges septentrionalis—(Etheridge Jnr)—Archbold et al., 1993: 226, pl. 32, figs 7, 10, 11.

Lectotype. South Australian Museum specimen P2135, an internal mould of a conjoined shell, figured and selected by Archbold (1986: 49, fig. 1A, B).

Comments. When re-establishing the species, Archbold (1986: 51) noted that one internal mould of a ventral valve, figured by Etheridge (1907, pl. 1, fig. 3) could not be located. It is housed in the collections of the Museum of Victoria with the registered number NMV P30708 and is refigured herein (Fig. 1C). The specimen is typical of the species as redescribed by Archbold (1986).

ACKNOWLEDGEMENTS

We thank Dr T. A. Darragh, Museum of Victoria, for information on the source of Etheridge's material described herein and Dr D. Holloway, Museum of Victoria, for the loan of the specimens. Mr M. Grover printed the photographs and Ms Elaine Brunton word-processed the manuscript. Our work on Late Palaeozoic marine faunas is supported by the Australian Research Council (Grant number A39332106).

REFERENCES

ARCHBOLD, N. W., 1981. Studies on Western Australia Permian brachiopods 2, The family Rugosochonetidae Muir-Wood 1962. *Proceedings of the Royal Society of Victoria*, 93: 109–128.

ARCHBOLD, N. W., 1986. *Megasteges septentrionalis* (Etheridge, 1907), a Permian brachiopod from the Northern Territory redescribed. *Proceedings of the Royal Society of Victoria*, 98: 49–51.

ARCHBOLD, N. W., 1988. Studies on Western Australian Permian brachiopods 8, The Late Permian brachiopod fauna of the Kirkby Range Member, Canning Basin. *Proceedings of the Royal Society of Victoria*, 100: 21–32.

ARCHBOLD, N. W., 1993. A zonation of the Permian brachiopod faunas of Western Australia. In *Gondwana Eight, Assembly, Evolution and Dispersal*, R. H. Findlay, A. Unrug, M. R. Banks & J. J. Veevers, eds, A. A. Balkema, Rotterdam, 313–321.

ARCHBOLD, N. W., 1995. Ufimian (early Late Permian) brachiopods from the Perth Basin, Western Australia. *Memoir of the Association of Australasian Palaeontologists*, 18: 153–163.

ARCHBOLD, N. W. & DICKINS, J. M., 1996. Permian (Chart 6). In *An Australian Phanerozoic Timescale*, G. C. Young & J. R. Laurie, eds, Oxford University Press, Melbourne, 127–135.

ARCHBOLD, N. W. & THOMAS, G. A., 1993. *Imperiospira*, a new Western Australia Permian Spiriferidae (Brachiopoda). *Memoir of the Association of Australasian Palaeontologists*, 15: 313–328.

ARCHBOLD, N. W., THOMAS, G. A. & SKWARKO, S. K., 1993. Brachiopods. *Bulletin of the Geological Survey of Western Australia*, 136: 45–51, 196–264 and microfiche supplement.

BOYD, D. W. & NEWELL, N. D., 1968. Hinge grades in the evolution of crassatellacean bivalves as revealed by Permian genera. *American Museum Novitates*, 2328: 1–52.

BOYD, D. W. & NEWELL, N. D., 1977. An addition to the known geographic range of the Permian pelecypod *Oriocrassatella*. *University of Wyoming, Contributions to Geology*, 16: 55–57.

CHAPMAN, F., 1924a. List of fossils from West Kimberley. Western Australia, *Annual Progress Report of the Geological Survey for the year 1923*, 35–36.

CHAPMAN, F., 1924b. Preliminary report on a collection of fossils made by Dr A. Wade in Western Australia and the Northern Territory. In *The Wade Collection of Fossils*, H. J. Green, Government Printer, Melbourne, 3–10.

CHAPMAN, F., 1924c. Table of upper and lower Carboniferous fossils from the Fitzroy River Area. *Commonwealth of Australia, Senate, Parliamentary Paper* 142: 19–20.

CAMPBELL, K. S. W. & MCKELVEY, B., 1972. The geology of the Barrington District, NSW. *Pacific Geology*, 5: 7–48.

CLARKE, M. J., 1987. Late Permian (late Lymingtonian =?Kazanian) brachiopods from Tasmania. *Alcheringa* 11: 261–289.

CLARKE, M. J. & FARMER, N., 1976. Biostratigraphic nomenclature for Late Palaeozoic rocks in Tasmania. *Papers and Proceedings of the Royal Society of Tasmania*, 110: 91–109.

CONDON, M. A., 1954. Progress report on the stratigraphy and structure of the Carnarvon Basin, Western Australia. *Report of the Bureau of Mineral Resources, Geology and Geophysics, Australia* 15: 1–163.

CONDON, M. A., 1967. The geology of the Carnarvon Basin, Western Australia, Part 2: Permian Stratigraphy. *Bulletin of the Bureau of Mineral Resources, Geology and Geophysics, Australia*, 77: 1–191.

DENYS DE MONTFORT, P., 1808. *Conchyliologie systématique, et classification methodique des coquilles; offrant leurs figures, leur arrangement générique, leurs descriptions caracteristiques, leurs noms; ainsi que leur synonymie en plusieurs langues*, Tome 1, Coquilles univalves, cloisonnees. Paris, P. Schoell.

DICKINS, J. M., 1956. Permian pelecypods from the Carnarvon Basin, Western Australia. *Bulletin of the Bureau of Mineral Resources, Geology and Geophysics*, Australia, 29: 1–55.

DICKINS, J. M., 1961. Permian pelecypods newly recorded from eastern Australia. *Palaeontology*, 4: 119–130.

DICKINS, J. M., 1963. Permian pelecypods and gastropods from Western Australia. *Bulletin of the Bureau of Mineral Resources, Geology and Geophysics*, Australia, 63: 1–203.

DICKINS, J. M., 1994. Permian bivalve faunas—stratigraphical and geographical distribution. In *Douzieme Congres International de la Stratigraphie et Geologie du Carbonifere et Permien*, Buenos Aires, Comptes Rendus, vol. 1: 523–536.

DICKINS, J. M., ARCHBOLD, N. W., THOMAS, G. A. & CAMPBELL, H. J., 1989. Mid-Permian Correlation. In *Onzieme Congres International de Stratigraphie et de Geologie du Carbonifere*, Beijing, Compte Rendu, Tome 2: 185–198.

DICKINS, J. M., ROBERTS, J. & VEEVERS, J. J., 1972. Permian and Mesozoic geology of the northwestern part of the Bonaparte Gulf Basin. *Bulletin of the Bureau of Mineral Resources, Geology and Geophysics, Australia*, 116: 17–27.

DICKINS, J. M. & SHAH, S. C., 1979. Correlation of the Permian marine sequences of India and Western Australia. In *Fourth International Gondwana Symposium: Papers (vol. 2)*, B. Laskar & C. S. Raja Rao, eds, Hindustan Publishing Corporation (India), Delhi, 387–408.

DICKINS, J. M. & SKWARKO, S. K., 1981. Upper Paleozoic pelecypods and gastropods from Irian Jaya, Indonesia. *Geological Research and Development Centre, Bandung, Paleontology Series* 2: 43–52.

DICKINS, J. M. & SKWARKO, S. K., 1993. Bivalves. *Bulletin of the Geological Survey of Western Australia*, 136: 52–54, 266–282 and microfiche supplement.

ETHERIDGE, R., Jnr, 1895. Official contributions to the Palaeontology of South Australia, Preliminary report on fossils collected in the North Territory by H. Y. L. Brown, Esq., Government Geologist. *South Australia, House of Assembly, Parliamentary Paper*, 1895, 82: 33–34.

ETHERIDGE, R., Jnr, 1897. Official contributions to the Palaeontology of South Australia, no. 10, The Permo-Carboniferous fossils of Treachery Bay, Victoria River. *South Australia, House of Assembly, Parliamentary Paper 1897*, 127: 14–16, pl. 1.

ETHERIDGE, R., Jnr, 1906. Official contributions to the Palaeontology of South Australia, no. 15, Preliminary report on other fossils forwarded to me by the Government Geologist of South Australia. *South Australia, House of Assembly, Parliamentary Paper 1906*, 55: 41–42.

ETHERIDGE, R., Jnr, 1907. Official contributions to the Palaeontology of South Australia, nos 17–22,

South Australia, House of Assembly, Parliamentary Paper 1907, 54: 1–21, pls 1–12.

GOLOVKINSKIY, N. A., 1868. O Permskoi formatsii v' tsenral'noi chasti Kamsko-Volshskago Basseina. *Materialy po Geologii Rossii*, 1: 275–415, pls 1–5.

GONZALEZ, C. R., 1976. *Oriocrassatella* y *Stutchburia* (Bivalvia), en la ingresion marina del Permico inferior de la Quebrada de Agua Negra, Depto Iglesia, Prov. de San Juan (Argentina). *Ameghiniana*, 13: 127–140.

GONZALEZ, C. R., 1982. Bivalvos de la formacion Agua del Jaguel, Permico inferior de Mendoza (Argentina). *Ameghiniana*, 19: 367–376.

GUPPY, D. J., LINDNER, A. W., RATTIGAN, J. H. & CASEY, J. N., 1958, The geology of the Fitzroy Basin, Western Australia, *Bulletin of the Bureau of Mineral Resources, Geology and Geophysics*, Australia, 36: 1–116.

HAMLET, B., 1928. Permische Brachiopoden, Lamellibranchiaten und Gastropoden von Timor. *Jaarboek van het Mijnwezen in Nederlandsch-Indie*, 56, 2: 1–115, pls 1–12.

KANEV, G. P., 1994. *Permskie dvustvorchatye Mollyuski gryady Chernysheva*. Rossiiskaya Akademya Nauk, Ural'skoe Otdelenie, Komi Nauchnyi Tsentr, Institut Geologii, Syktyvkar, pp. 1–80, pls 1–6.

KNIGHT, J. B., 1941. Paleozoic gastropod genotypes. *Geological Society of America, Special Paper* 32: 1–510.

LIU, N.-P. & CUI, X.-S., 1983. Discovery of *Eurydesma* —fauna from Rutog, northwest Xizang (Tibet), and its biogeographic significance. *Earth Science, Journal of Wuhan College of Geology*, 1983, 1: 79–92.

LOBANOVA, O. V., 1961. Permskie peletsipody Grodekovskogo raiona zapadnogo Primor'ya. *Sbornik Statei po Palcontologii i Biostratigrafii*, 25: 52–80.

LOGAN, A., 1967. The Permian Bivalvia of northern England. *Palaeontographical Society Monograph*, 121, 518: 1–72, pls 1–10.

MANCENIDO, M. O., GONZALEZ, C. R. & DAMBORENEA, S. E., 1976. La fauna de la Formacion del Salto (Paleozoico superior de la Provincia de San Juan). Parte III: Bivalvia 2. *Ameghiniana* 13: 85–106.

MAXWELL, W. G. H., 1964. The geology of the Yarrol Region. Part 1. Biostratigraphy. *Papers, Department of Geology University of Queensland*, 5, 9: 1–79.

MUROMTSEVA, V. A., 1984. Permskie morskie otlozheniya i dvustvorchatye mollyuski Sovetskoi Arktiki. *Trudy Vsesoyuznyi ordena Trudovogo Krasnogo Znameni Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut*, Nedra, Leningrad. 1–154, pls 1–53.

NEWELL, N. D., 1955. Permian pelecypods of east Greenland. *Meddelelser om Gronland*, 110, 4: 1–34, pls 1–5.

NEWELL, N. D., 1958. A note on Permian crassatellid pelecypods. *American Museum Novitates*, 1878: 1–6.

PLAYFORD, P. E., COPE, R. N., COCKBAIN, A. E., LOW, G. H. & LOWRY, D. C., 1975. Phanerozoic. *Memoir of the Geological Survey of Western Australia*, 2: 223–433.

PRENDERGAST, K. L., 1935. Some Western Australian Upper Palaeozoic fossils. *Journal of the Royal Society of Western Australia*, 21: 9–35.

REED, F. R. C., 1932. New fossils from the Agglomeratic Slate of Kashmir. *Memoirs of the Geological Survey of India, Palaeontologia Indica, New Series*, 20, 1: 1–79, pls 1–13.

ROCHA-CAMPOS, A. C., 1970. Moluscos Permianos da Formacao Rio Bonito (Subgrupo Guata) SC. *Departamento Nacional da Prodocao Mineral, Divisao de Geologica e Mineralogia Boletim*, 251: 1–89.

SKWARKO, S. K., 1993a. The Permian System. *Bulletin of the Geological Survey of Western Australia*, 136: 1–3 + microfiche supplement.

SKWARKO, S. K., 1993b. A list of Permian fossils from the Collie, Perth, Carnarvon and Canning Basins. *Bulletin of the Geological Survey of Western Australia*, 136: 89–109.

SUVEIZDIS, P. I., 1975. Permskaya Sistema Pribaltiki (fauna i stratigrafiya). *Trudy Litovskii Nauchno-Issledovatel'skii Geologorazvedochnyi Institut*, Vypusk 29: 1–305.

TEICHERT, C., 1941. Upper Paleozoic of Western Australia: Correlation and paleogeography. *Bulletin of the American Association of Petroleum Geologists* 25: 371–415.

TEICHERT, C., 1951. The marine Permian faunas of Western Australia (an interim review). *Paläontologische Zeitschrift* 24: 76–90.

TEICHERT, C., 1952. Carboniferous, Permian and Jurassic in the northwest Basin, Western Australia. In *Symposium sur les series de Gondwana, XIX^e Congrès Geologique International, Alger 1952*, 115–135

TEICHERT, C., 1957. Notes on the geology of the Carnarvon (Northwest) Basin, Western Australia. *Journal of the Royal Society of Western Australia*, 40: 65–72.

TERMIER, G., TERMIER, H., DE LAPPARENT, A. F. & MARIN, P., 1974. Monographie du Permo-Carbonifere de Wardak (Afghanistan Central). Documents des Laboratoires de Geologie de la Faculte des Sciences de Lyon, Hors Serie, 2: 1–167, pls 1–38.

THOMAS, G. A., 1957. Oldhaminid brachiopods in the Permian of Northern Australia. *Journal of the Palaeontological Society of India*, 2: 174–182.

THOMAS, G. A., 1958. Stratigraphy and palaeontology of the Port Keats Area, Northern Territory. *Australian and New Zealand Association for the Advancement of Science, 1958 Congress, Section C, Abstracts, Lectures, Papers*, pp. 1–5.

THOMAS, G. A. & DICKINS, J. M., 1954. Correlation and age of the marine Permian formations of Western Australia. *Australian Journal of Science*, 16: 219–223.

WANNER, C., 1940. Neue Permische Lamellibranchiaten von Timor. In *Geological Expedition of the University of Amsterdam to the Lesser Sunda Islands in the southeastern part of the Netherlands East Indies 1937 under leadership of H. A. Brouwer*, vol. 2: 369–395, pl. 1.

WATERHOUSE, J. B., 1975. New Permian and Triassic brachiopod taxa. *Papers, Department of Geology University of Queensland*, 7, 1: 1–23.

YAKOVLEV, N. N., 1902. Paleozoiskii predstavitel' Crassatellidae. *(Schizodus planus* Golowk.*). Izvestiya Geologicheskogo Komiteta*, 21, 9: 755–760, pl. 10.

YAKOVLEV, N. N., 1928. *Procrassatella,* novyi rod iz Permi. *Ezhegodnik Russkogo Paleontologicheskogo Obshchestva*, 7: 119–125.